Climatological Data for November, 1909.
DISTRICT No. 7, LOWER MISSISSIPPI VALLEY.

ISAAC M. CLINE, District Editor.

GENERAL SUMMARY.

Warm weather prevailed throughout the district during the first decade and the monthly maximum temperatures occurred at all stations during this time. A period of decidedly cooler weather, which reached Colorado and New Mexico on the 13th, extended eastward over the district on the 14th and 15th, and the monthly miminum temperatures occurred generally from the 13th to 18th. Killing frosts occurred during this period in many localities, with minimum temperatures below 32° southward into northern Louisiana. Moderate temperatures prevailed during the third decade, except that a cold wave overspread the northwestern portion of the district about the 28th. Monthly mean temperatures and departures from the normal for the various States and areas are reported as follows: Colorado area, 40.3°, +2.6°; New Mexico area, 46.2°, +2.5°; Texas area, 54.3°, +5.6°; Kansas area, 54.0°, +6.2°; Oklahoma area, 55.8°, +6.6°; Missouri area, 56.2°, +10.3°; Tennessee area, 58.6°, +9.8°; Arkansas, 59.3°, +8.7°; Mississippi area, 61.6°, +7.5°; Louisiana, 64.0°, +5.6°. The precipitation was above the normal generally over the northern and below over the southern portions of the district. Precipitation occurred generally from the 10th to the 16th, and again over the western and northern portions of the district from the 27th to the close of the month. Scattered showers occurred on many other days, except that there was no precipitation in the Colorado and New Mexico areas from the 1st to the 9th, and in the New Mexico area from the 16th to the 26th. There was very little rain in the southeastern portion of the district during the last decade. Monthly precipitation and departures from the normal for the various States and parts of States are reported as follows: Colorado area, 1.90, +1.46; New Mexico area, 1.26, + 0.21; Texas area, 3.52, +0.23; Kansas area, 5.67, +4.54; Oklahoma, 5.70, +3.30; Missouri area, 4.79, +1.87; Tennessee area, 5.02, +0.22; Arkansas, 3.75, 0.00; Mississippi area, 2.46, −1.65; Louisiana, 1.64, −2.14.

TEMPERATURE.

Abnormally high temperatures prevailed during the month, and over a large part of the district the mean temperature was higher than during any previous November. The excess in temperature was more than 8° over eastern and south-central Oklahoma, northeastern Arkansas, the northeast portion of the Kansas area, and the Missouri and Tennessee areas; elsewhere the excess ranged from 1.5° to 7.7°, being smallest over southwestern Oklahoma and the eastern portion of the Colorado area. The highest monthly mean temperature was 69.9° at Burrwood, Plaquemines Parish, La., and the lowest was 27.8° at Lake Moraine, El Paso County, Colo. The monthly maximum reached or exceeded 85° at some stations in each State in the district, except in the Colorado area, and the maximum was 90° or above at some stations in Arkansas, Louisiana, and Oklahoma, and in the Kansas and Texas areas. The highest temperature recorded was 96° at Kingman, Kingman County, Kans., on the 4th, and a maximum temperature of 94° was recorded at Channing, Hartley County, Tex., on the 2d. The average daily maximum exceeded 70° in some localities in Oklahoma, and the Texas, Missouri, and Tennessee areas, and was above 75° generally over Louisiana and the Mississippi area. The lowest temperature recorded was −9° at Lake Moraine, El Paso County, Colo. Minimum temperatures of 32°, or lower, occurred generally, except in southern Louisiana. Temperatures of zero, or below, were recorded in the mountainous portions of the Colorado and New Mexico areas, and in the more elevated portions the monthly mean minimum was below 20°. Killing frosts occurred in all portions of the district, except in southern Louisiana.

PRECIPITATION BY DRAINAGE AREAS.

Arkansas River and tributaries.—Excessive precipitation occurred generally over the Arkansas Basin, except in Arkansas. The precipitation from 30 stations in Colorado averaged 1.93 inches and was 1.2 inches above the normal. Three stations reported more than 3 inches and 2 stations less than 1 inch. Along the Arkansas proper in Kansas and Oklahoma the amounts from 67 stations averaged 5.58 inches, and the excess was 4.4 inches. Seventeen stations reported more than 7 inches and no station less than 2 inches. Over the Cimarron Basin the average amount determined from the records of 15 stations was 5.10 inches, and the excess was 4.2 inches. In those portions of this drainage area that lie in Colorado and New Mexico, the precipitation was generally about 1 inch. In Kansas the amounts ranged from 2.68 to 11.69; in Oklahoma they were above 6 inches, except at 3 stations, and only 1 station reported less than 2 inches. Over the headwaters of the Canadian, in New Mexico, the precipitation from 34 stations averaged 1.27 inches and was about 0.5 inch above the normal; from the Colorado line to its junction with the Arkansas, the precipitation reported from 24 stations averaged 5.14 inches and was 2.7 inches above the normal. Two stations reported more than 11 and only 2 stations less than 3 inches. Over the basin of the Arkansas below the Oklahoma line, the precipitation from 15 stations averaged 3.6 inches and was about 0.2 inch below the normal.

Red River and tributaries.—Heavy precipitation occurred throughout this drainage area, except over those portions that lie in Arkansas and Louisiana. The average amount determined from the records of 39 stations above the Arkansas line was 4.77 inches, and the average excess was 2.6 inches. Below the Texas line, the amounts decreased from about 3 inches in Arkansas to less than 2 inches in Louisiana; the precipitation from 17 stations averaged about 2 inches, and was less than half the normal amount.

Mississippi south of St. Louis and small tributaries.—Excessive precipitation occurred over this drainage area, except in Mississippi, southern Arkansas, and Louisiana. In the immediate Mississippi Valley the precipitation from 34 stations averaged 3.80 inches; 16 stations reported more than 4 and only 2 less than 2 inches. There was an excess at most stations north of the 35th parallel, but southward to the coastal plain there was a general deficiency, amounting to more than 1 inch at many stations. In the Valley of the Meramec the precipitation averaged 4.47 inches and the excess was 1.82 inches. In the White River Valley the precipitation was uniformly heavy, except at a few stations; the amounts from 19 stations averaged 4.42 inches, and 7 stations reported more than 5 inches. The precipitation was above the normal, except at a few widely scattered stations, the departure being about 1.2 inches. Over the Yazoo Basin the precipitation ranged from 1.06 to 6.48 inches, and the average determined from the records of 16 stations was 2.66 inches. There was a deficiency throughout this basin which amounted to more than 2 inches in some localities, and averaged about 1.7 inches. The precipitation was light throughout the Valley of the Black, and the average from 8 stations was 1.45 inches; about half the normal amount. Over the headwaters of the Ouachita, in Arkansas, the precipitation ranged from 3 to 4 inches, and the amounts decreased southward to less than 1 inch in northern Louisiana. The amounts from 16 stations averaged 2.70 inches; 1 station reported more than 4 inches and 2

less than 1 inch. There was a general deficiency which ranged from about 0.50 inch over the headwaters to more than 3 inches in northern Louisiana, the average departure being about 1.5 inches.

Louisiana coastal plain.—Over the greater portion of this area the precipitation was light and the amounts ranged from none at Reserve, St. John Baptist Parish, to 4.18 inches at Jennings, Calcasieu Parish. The amounts from 24 stations averaged 1.77 inches. Two stations reported 4 inches, or more, and 5 less than 1 inch. The precipitation was below the normal, except at 2 stations, the average deficiency being 1.6 inch.

SNOWFALL.

Over the mountainous portions of Colorado and New Mexico areas, the snowfall was heavier than is usual for November, averaging 21.9 inches for the Colorado area and 9.9 inches for the New Mexico area. There was a severe snowstorm, for the time of the year, over the northwestern counties of Texas on the 28th and 29th, the amounts being slightly over 6 inches in the northern portion of the Panhandle; the heaviest fall reported was 6.4 inches at Dalhart. Light snows occurred in many localities in Kansas, the average fall being 0.5 inch. In Oklahoma snow occurred at but 2 stations, Supply reporting a trace and Kingfisher 7.0. This occurred during the storm of the 12th to 16th.

RIVERS.

All streams in that portion of the Arkansas basin that lie in Kansas and Oklahoma were bank full at the close of the month, and freshets occurred in some places as a result of the excessive precipitation over those areas. At Little Rock the stage was slightly above or below 1 foot until the 18th when a rapid rise commenced and a stage of 10.8 feet was recorded on the 22d. From the 23d to the close of the month the river fell slightly and the stage was 4.8 feet on the 30th.

No decided change occurred in the stages of the Red River. The extreme stages, in feet, were as follows: Dennison, −0.5 on the 14th to 2.9 on the 20th; Arthur City, 4.8 on the 1st to 8.9 on the 22d; Lewis Ferry, 3.8 on the 1st to 7.0 on the 25th; Fulton, 4.9 on the 9th to 9.0 on the 26th; Shreveport, −4.3 on the 1st to −0.6 on the 30th; Alexandria, −0.6 on the 3d to 1.7 on the 30th.

There was a slight rise in the Ouachita at Camden from the 15th to the 22d, when a stage of 8.8 feet was recorded; otherwise changes in the stages of this stream were slight.

The lower Mississippi rose during the greater part of the month. The rises in feet occurred as follows: Memphis, from 6.2 on the 3d to 14.7 on the 25th; Helena, 6.3 on the 6th to 16.9 on the 26th; Arkansas City, 6.8 on the 6th to 20.2 on the 28th; Natchez, 4.6 on the 8th to 16.5 on the 30th; Baton Rouge, 4.5 on the 18th to 9.9 on the 30th; and New Orleans, 3.8 on the 8th to 5.5 on the 30th. Small streams in some portions of Mississippi were very low.

NOTES.

The rise in the Arkansas River during the second decade enabled navigation to be resumed, it having been suspended for many weeks on account of the low water.

Snowstorms in northwestern Oklahoma from the 12–16th and in the Texas Panhandle during the 28th and 29th caused some injury to stock interests.

RELATIONS BETWEEN PRECIPITATION, RUN-OFF, AND DISCHARGES IN THE TALLAHATCHIE DRAINAGE DISTRICT.

By A. L. DABNEY, Assistant Chief Engineer, Tallahatchie Drainage Commission.

This district comprises about 1,900 square miles in the north end of what is commonly known as the "Yazoo Delta" in Mississippi. It exists under a special law passed by the Mississippi Legislature and approved by the Governor, March 2, 1908. The territory embraced is all of Tunica, Quitman, and Coahoma counties and parts of De Soto, Tate, Panola, and Tallahatchie counties. It is bounded on the north by the Mississippi and Tennessee State line, on the east by the base of the hills bordering the Mississippi River Valley, on the west by the Mississippi River, on the south by the south lines of Coahoma and Tallahatchie counties.

There is a natural divide which runs approximately north and south through the district. The area west of the divide, about 270,000 acres, is made tributary to Sunflower River, while the remainder of the district, about 900,000 acres, is tributary to Coldwater and Tallahatchie rivers, the latter joining with Yalobusha River a short distance below this district to form the Yazoo, which, after being joined by the Sunflower much lower down, discharges into the Mississippi through the Yazoo Canal in front of Vicksburg.

The hill area drained by Coldwater and Tallahatchie rivers and minor streams entering the district is about 3,800 square miles, which, added to the 1,400 square miles within the district and east of the main divide, gives a total of 5,200 square miles tributary to Tallahatchie River above Philipp.

Drainage commissioners.—There are 11 commissioners, the larger counties having 2 each and the counties with a small area in the district having 1 each. The commissioners are appointed by the governor, and hold office 4 years.

Funds for the work.—The law creating the district provides for an annual "flat" acreage tax not to exceed 7 cents, to pay for preliminary surveys and administration, and to be reduced in the judgment of the drainage commission. There are to be 2 betterment assessments—1 for the main drains and 1 for the laterals. Construction work will be paid for by a tax levied on the betterment, not to exceed 10 per cent per year. Bonds may be floated, to be refunded from these taxes.

Surveys.—The surveys of the Mississippi River Commission and the levee district afforded a line of control levels along the west side of the district. A line of precise levels was run the length of the district near the east side, and numerous cross lines were run connecting these two main lines, giving a comprehensive system of control levels.

By a cooperative agreement, the U. S. Geological Survey began a topographical survey of this district, and about half the territory has been covered thus far with this system. The other half has been covered with a system of transverse lines with levels, about every 2 miles, and transverses of all important streams. It is proposed to extend the detail topographic survey over this area also.

A number of cross sections of the more important streams have been taken, the location of each section being shown on the map by its number.

Data for drainage plans—Before attempting to solve the drainage problems presented, it was evident that as much data on rainfall and run-off as possible should be available. For the rainfall, recourse was had to the records of the U. S. Weather Bureau. For the run-off, to the water supply papers of the U. S. Geological Survey, Reports of the U. S. Department of Agriculture Drainage Investigations, and to actual gagings in cooperation with the U. S. Geological Survey, Hydrographic Department.

Rainfall.—Daily records of the rainfall were procured from the local offices, U. S. Weather Bureau for Memphis and Vicksburg since 1871, for Helena, Arkansas City, Austin, Clarksdale, Swan Lake, and Greenwood since 1897, and for about 15 cooperative stations on the watersheds of Coldwater, Tallahatchie, and Yalobusha rivers since January, 1907.

From the older records summaries were made giving, for each station and each month, the following data:

Heaviest precipitation in 24 hours, 48 hours, and and 72 hours.

Number of days with more than 1 inch, 2 inches, up to 6 inches.

Total for the month.